IN THE CLAIMS

1. (Previously Presented) A method of de-skewing a plurality of serial data signals respectively outputted from a plurality of data lanes, the method comprising:

providing a de-skew signal for initiating a de-skewing process;

simultaneously feeding a test signal to inputs of the plurality of data lanes and monitoring respective outputs thereof;

respectively detecting a predetermined data element of the test signal outputted from each of the plurality of data lanes;

measuring respective elapsed times from the detection of the predetermined data element outputted from each of the plurality of data lanes to the detection that the predetermined data element has been outputted from all of the plurality of data lanes; and

de-skewing the plurality of serial data signals by respectively delaying them in accordance with their respective measured elapsed times;

wherein, once de-skewed, further determination of elapsed times occurs only when another de-skew signal is received.

2. (Original)   The method of claim 1, wherein the test signal comprises the predetermined data element, a lane identifier, and a predetermined number of additional data symbols, the predetermined data element comprising a predetermined data character.

3. (Original)   The method of claim 1, wherein the elapsed times are measured by a plurality of lane tolerance counters, each counter initiating counting upon the detection of the predetermined data element in its data lane and each counter stopping counting upon the detection that the predetermined data element has been outputted from all of the plurality of data lanes.

4. (Original)   The method of claim 1, wherein the plurality of serial data signals are respectively delayed by a plurality of registers.

5. (Original)   The method of claim 3, wherein the plurality of serial data signals are respectively delayed by a plurality of registers.

6. (Currently Amended)   The method of claim 5, wherein the amount of delay of each data signal is selected by a respective multiplexer connected to the plurality of registers, each multiplexer being controlled by [[its']] its respective counter.

7. (Previously Presented) A method of de-skewing a plurality of serial data signals respectively outputted from a plurality of data lanes, the method comprising:

simultaneously feeding a test signal to inputs of the plurality of data lanes and monitoring respective outputs thereof;

respectively detecting a predetermined data element of the test signal outputted from each of the plurality of data lanes;

measuring respective elapsed times from the detection of the predetermined data element outputted from each of the plurality of data lanes to the detection that the predetermined data element has been outputted from all of the plurality of data lanes;

de-skewing the plurality of serial data signals by respectively delaying them in accordance with their respective measured elapsed times; and

detecting elapsed time from a first detection of the predetermined data element on any of the plurality of data lanes and declaring a de-skewing failure upon the detected elapsed time reaching a predetermined amount before the predetermined data element has been detected on all of the plurality of data lanes.

8. (Previously Presented)   An apparatus for de-skewing a plurality of serial data signals respectively outputted from a plurality of data lanes, the apparatus comprising:

a de-skew signal for initiating a de-skewing process;

a test signal generator simultaneous feeding a test signal to inputs of the plurality of data lanes in response to the de-skew signal;

a plurality of data element detectors respectively connected to outputs of the plurality of data lanes to respectively detect a predetermined data element of the test signal outputted from each of the plurality of data lanes;

a control state machine connected to the plurality of data element detectors to detect that the predetermined data element of the test signal outputted from each of the plurality of data lanes has been detected by all of the data element detectors;

a plurality of elapsed time detectors to detect respective elapsed times from the detection by the data element detectors of the predetermined data element outputted from each of the plurality of data lanes to the detection by the control state machine that the predetermined data element has been outputted from all of the plurality of data lanes; and

a plurality of time delay units respectively connected to the plurality of elapsed time detectors to respectively delay the plurality of serial data signals in accordance with the detected elapsed times of their respective elapsed time detectors;

wherein, once de-skewed, the control state machine refrains from further control of the serial data signals until another de-skew signal is received.

9. (Original)   The apparatus of claim 8, wherein the test signal comprises the predetermined data element, a lane identifier, and a predetermined number of additional data symbols, the predetermined data element comprising a predetermined data character.

10. (Original) The apparatus of claim 8, wherein the plurality of elapsed time detectors respectively comprise a plurality of lane tolerance counters, each counter initiating counting upon the detection of the predetermined data element in its data lane by its respective data element detector and each counter stopping counting upon the detection that the predetermined data element has been outputted from all of the plurality of data lanes as detected by the control state machine.

11. (Original) The apparatus of claim 8, wherein the plurality of time delay units respectively comprise a plurality of registers.

12. (Previously Presented) The apparatus of claim 10, wherein the plurality of time delay units respectively comprise a plurality of registers.

13. (Currently Amended) The apparatus of claim 12, further comprising a plurality of multiplexers respectively connected to the plurality of registers and plurality of counters, each multiplexer selectively determining the amount of delay of its respective data signal in accordance with an output from [[its']] its respective counter.

14. (Previously Presented) An apparatus for de-skewing a plurality of serial data signals respectively outputted from a plurality of data lanes, the apparatus comprising:

a test signal generator simultaneous feeding a test signal to inputs of the plurality of data lanes;

a plurality of data element detectors respectively connected to outputs of the plurality of data lanes to respectively detect a predetermined data element of the test signal outputted from each of the plurality of data lanes;

a control state machine connected to the plurality of data element detectors to detect that the predetermined data element of the test signal outputted from each of the plurality of data lanes has been detected by all of the data element detectors;

a plurality of elapsed time detectors to detect respective elapsed times from the detection by the data element detectors of the predetermined data element outputted from each of the plurality of data lanes to the detection by the control state machine that the predetermined data element has been outputted from all of the plurality of data lanes;

a plurality of time delay units respectively connected to the plurality of elapsed time detectors to respectively delay the plurality of serial data signals in accordance with the detected elapsed times of their respective elapsed time detectors; and

wherein the control state machine monitors elapsed time from a first detection of the predetermined data element on any of the plurality of data lanes by one of the plurality of elapsed time detectors and declares a de-skewing failure upon the monitored elapsed time reaching a predetermined amount before the predetermined data element has been detected on all of the plurality of data lanes by the plurality of data element detectors.

15. (Original) The apparatus of claim 10, further comprising a plurality of sticky flip-flops respectively disposed between said plurality of data element detectors and their respective counters.

16. (Previously Presented) A program storage device, readable by machine and tangibly embodying a program of instructions executable by the machine to perform a method of de-skewing a plurality of serial data signals respectively outputted from a plurality of data lanes, the method comprising:

providing a de-skew signal for initiating a de-skewing process;

simultaneously feeding a test signal to inputs of the plurality of data lanes and monitoring respective outputs thereof;

respectively detecting a predetermined data element of the test signal outputted from each of the plurality of data lanes;

measuring respective elapsed times from the detection of the predetermined data element outputted from each of the plurality of data lanes to the detection that the predetermined data element has been outputted from all of the plurality of data lanes; and

de-skewing the plurality of serial data signals by respectively delaying them in accordance with their respective measured elapsed times;

wherein, once de-skewed, further determination of elapsed times occurs only when another de-skew signal is received.

17. (Original) The device of claim 16, wherein the test signal comprises the predetermined data element, a lane identifier, and a predetermined number of additional data symbols, the predetermined data element comprising a predetermined data character.

18. (Currently Amended) The device of claim 16, wherein the elapsed times are measured by a plurality of lane tolerance counters, each counter initiating counting upon the detection of the predetermined data element ~~multiplexer selects lane~~ and each counter stopping counting upon the detection that the predetermined data element has been outputted from all of the plurality of data lanes.

19. (Original) The device of claim 16, wherein the plurality of serial data signals are respectively delayed by a plurality of registers.

20. (Original) The device of claim 18, wherein the plurality of serial data signals are respectively delayed by a plurality of registers.

21. (Currently Amended)   The device of claim 20, wherein the amount of delay of each data signal is selected by a respective multiplexer connected to the plurality of registers, each multiplexer being controlled by [[its']] its respective counter.

22. (Previously Presented)   A program storage device, readable by machine and tangibly embodying a program of instructions executable by the machine to perform a method of de-skewing a plurality of serial data signals respectively outputted from a plurality of data lanes, the method comprising:

simultaneously feeding a test signal to inputs of the plurality of data lanes and monitoring respective outputs thereof;

respectively detecting a predetermined data element of the test signal outputted from each of the plurality of data lanes;

measuring respective elapsed times from the detection of the predetermined data element outputted from each of the plurality of data lanes to the detection that the predetermined data element has been outputted from all of the plurality of data lanes;

de-skewing the plurality of serial data signals by respectively delaying them in accordance with their respective measured elapsed times; and

detecting elapsed time from a first detection of the predetermined data element on any of the plurality of data lanes and declaring a de-skewing failure upon the detected elapsed time reaching a predetermined amount before the predetermined data element has been detected on all of the plurality of data lanes.